Industrial protective headwear —
Performance, selection, care, and use
Legal Notice for Standards

Canadian Standards Association (operating as “CSA Group”) develops standards through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA Group administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

Disclaimer and exclusion of liability
This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document’s fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party’s intellectual property rights. CSA Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document’s compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its contents, and CSA Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

Intellectual property rights and ownership
As between CSA Group and the users of this document (whether it be in printed or electronic form), CSA Group is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, the unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA Group’s and/or others’ intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA Group reserves all intellectual property rights in this document.

Patent rights
Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA Group shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

Authorized use of this document
This document is being provided by CSA Group for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:
• load this document onto a computer for the sole purpose of reviewing it;
• search and browse this document; and
• print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA Group to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to
• alter this document in any way or remove this Legal Notice from the attached standard;
• sell this document without authorization from CSA Group; or
• make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.
Standards Update Service

Z94.1-15
January 2015

Title: Industrial protective headwear — Performance, selection, care, and use

To register for e-mail notification about any updates to this publication
• go to store.csagroup.org
• click on Product Updates

The List ID that you will need to register for updates to this publication is 2423305.

If you require assistance, please e-mail techsupport@csagroup.org or call 416-747-2233.

Visit CSA Group’s policy on privacy at www.csagroup.org/legal to find out how we protect your personal information.
Z94.1-15

Industrial protective headwear —
Performance, selection, care, and
use

*A trademark of the Canadian Standards Association, operating as “CSA Group”

Published in January 2015 by CSA Group
A not-for-profit private sector organization
178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3

To purchase standards and related publications, visit our Online Store at store.csagroup.org
or call toll-free 1-800-463-6727 or 416-747-4044.

ISBN 978-1-77139-697-4

© 2015 Canadian Standards Association
All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.
Contents

Technical Committee on Industrial Protective Headwear 4

Preface 7

1 Scope 9

2 Reference publications 9

3 Definitions 10

4 Classification 12
4.1 General 12
4.2 Type 1, Class E (20 000 V electrical rating) 12
4.3 Type 1, Class G (2200 V electrical rating) 12
4.4 Type 1, Class C (no electrical rating) 12
4.5 Type 2, Class E (20 000 V electrical rating) 12
4.6 Type 2, Class G (2200 V electrical rating) 13
4.7 Type 2, Class C (no electrical rating) 13

5 Selection, care, and use of headwear 13
5.1 Hazard assessment 13
5.2 Headwear selection 14
5.3 Assembly and fitting of headwear 15
5.3.1 Manufacturer's instructions 15
5.3.2 Use of specified components 15
5.3.3 Installing the suspension 15
5.3.4 Fitting 15
5.4 Guidance on inspection of headwear 16
5.5 Guidance for cleaning of headwear 16
5.6 Care of headwear 17
5.7 Accessories 18
5.7.1 General guidance 18
5.7.2 Addition of decals, laminates, stickers, or tape to headwear 18
5.7.3 Bandanas, handkerchiefs, bouffants (hairnets), or welder's caps under headwear 18
5.7.4 Baseball-style caps under headwear 18
5.7.5 Winter liners 18
5.7.6 Painting of headwear 18
5.7.7 Chinstrap assemblies 19
5.7.8 Insect repellent 19
5.7.9 High-visibility headwear 19

6 Design and construction 19
6.1 General 19
6.2 Materials 19
6.2.1 General 19
6.2.2 Documentation 19
6.2.3 Cleaners 19
6.2.4 Finishes 19
6.2.5 Non-irritants 20
6.2.6 Adhesives 20
6.2.7 Polymeric changes 20
6.2.8 Flame resistance of shell and ignition resistance of liner 20
6.2.9 Prevention of skin irritation 20
6.2.10 Electrically-conductive components in Class E headwear 20
6.2.11 Plugging of holes in Class E headwear 20
6.2.12 Alterations and after-market modifications 20
6.3 Protection area 21
6.3.1 Minimum protected area 21
6.3.2 Penetration (test blade) 21
6.4 Projections 21
6.5 Accessories and fittings 21

7 Test requirements 21
7.1 General 21
7.2 Sampling for testing 22
7.3 Test environment 22
7.4 Test headforms 22
7.5 Establishment of test line 23
7.6 Conditioning 23
7.6.1 General 23
7.6.2 Ambient preconditioning 23
7.6.3 High temperature 23
7.6.4 Low temperature 23
7.6.5 Water immersion 23
7.6.6 Solvent wipe 24

8 Dielectric strength test 24
8.1 General 24
8.2 Sample preparation 24
8.3 Apparatus and set-up 24
8.4 Test method 25
8.5 Test voltages 25
8.5.1 General 25
8.5.2 Class E headwear 25
8.5.3 Class G headwear 25
8.6 Dielectric strength 25
8.6.1 Class E headwear 25
8.6.2 Class G headwear 25

9 Impact attenuation test 25
9.1 Apparatus and set-up 25
9.2 Instrumentation check 26
9.3 Test method and requirements for Type 1 headwear 26
9.4 Test method and requirements for Type 2 headwear 27

10 Penetration resistance test 27
10.1 Apparatus 27
10.2 Test method and requirements for Type 1 headwear 28
10.3 Test method and requirements for Type 2 headwear 28

11 Passive retention test 29
11.1 General 29
11.2 Apparatus and set-up 29
11.3 Change in measured angle limit 30

12 Shell flammability and liner ignition-resistance tests 30
12.1 Shell flammability-resistance test 30
12.1.1 General 30
12.1.2 Apparatus 30
12.1.3 Calibration 31
12.1.4 Test procedure 31
12.1.5 Flammability resistance 31
12.2 Liner ignition-resistance test 31
12.2.1 General 31
12.2.2 Apparatus 31
12.2.3 Test procedure 31
12.2.4 Ignition resistance 32

13 Permanent markings and instructions for use 32
13.1 Markings and labels 32
13.2 Instructions for use 32

Annex A (informative) — Sample headwear selection form 48
Annex B (informative) — Protective headwear in a safety system 49
Annex C (informative) — Terminology related to selection, care, and use of protective headwear 50
Technical Committee on Industrial Protective Headwear

J.A. Zaichkowski
Liquor Control Board of Ontario (LCBO),
Toronto, Ontario
Category: User Management
Chair

C. Dente
Dentec Safety Specialists, Inc,
Newmarket, Ontario
Category: Producer Interest
Vice-Chair

R.M. Allen
Waterloo North Hydro Inc,
Waterloo, Ontario
Category: User Labour

P.J. Bishop
PJB Consulting,
Elmira, Ontario
Category: General Interest

D.L. Curts
3M Canada Company,
London, Ontario
Associate

R. Dente
Degil Safety Products Inc.,
Vaughan, Ontario
Associate

W. Eng
ESDC-Labour Program,
Toronto, Ontario
Category: Regulatory Authority

D.R. Fulton
North West Environmental Group Ltd,
Victoria, British Columbia
Category: General Interest

G.P. Green
Nova Scotia Department of Labour Advanced Education,
Halifax, Nova Scotia
Category: Regulatory Authority

J.D. Greer
DSI Safety Inc / Securite DSI Inc,
Laval, Québec
Category: Producer Interest
M. Gupta  
Draeger Safety Canada Limited,  
Mississauga, Ontario  
*Category: General Interest*

B. Henry  
Fanshawe College of Applied Arts and Technology,  
London, Ontario  
*Category: User Management*

P.M. Johnson  
Honeywell Safety Products USA, Inc.,  
Smithfield, Rhode Island, USA  
*Category: Producer Interest*

J.M. Kline  
Kimberly-Clark Professional Services,  
Belmont, Michigan, USA  
*Category: General Interest*

E. Lee  
WorkSafe BC,  
Vancouver, British Columbia  
*Category: Regulatory Authority*

R. Mullin  
Honeywell Safety Products,  
Mississauga, Ontario  
*Associate*

A. Peart  
Canadian Labour Congress,  
Ottawa, Ontario  
*Category: User Labour*

M. Peters  
MSA North America,  
Cranberry Township, Pennsylvania, USA  
*Category: Producer Interest*

D.B. Pfriem  
ICS Laboratories Inc.,  
Brunswick, Ohio, USA  
*Associate*

P. Richard  
CSA Group,  
Pointe-Claire, Québec  
*Associate*

J. Rihn  
MSA North America,  
Cranberry Township, Pennsylvania, USA  
*Associate*

M. Russo  
Infrastructure Health and Safety Association,  
Mississauga, Ontario  
*Category: General Interest*
<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>City, Province</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Scott</td>
<td>3M Canada Company</td>
<td>London, Ontario</td>
<td>Producer Interest</td>
</tr>
<tr>
<td>E.V. Stefov</td>
<td>Thornhill, Ontario</td>
<td></td>
<td>Associate</td>
</tr>
<tr>
<td>G. Taillon</td>
<td>Ontario Ministry of Labour</td>
<td>Toronto, Ontario</td>
<td>Regulatory Authority</td>
</tr>
<tr>
<td>J. Wright</td>
<td>UFCW Canada</td>
<td>Toronto, Ontario</td>
<td>User Labour</td>
</tr>
<tr>
<td>D. Shanahan</td>
<td>CSA Group</td>
<td>Toronto, Ontario</td>
<td>Project Manager</td>
</tr>
</tbody>
</table>
Preface


This edition incorporates several changes:

a) A “protected area” has been established through the specification of a test line on the headform used for impact and penetration tests (Clauses 6.3.1, 7.4.6.2, 10.2.5, 10.3.6, and Figure 2).

b) Technical changes have been made to penetration test procedure and apparatus (Clause 7.4.6).

c) The largest size of headform (size “O”) is no longer specified for testing purposes (Clause 7.4.7).

d) The UV resistance requirements and pre-conditioning procedure have been removed pending future research to validate the procedure against real-use conditions (exposure to sunlight).

e) Clarification of symbols used on labels has been provided (Annex C).

f) An explanation of the difference between accredited product certification and a manufacturer's self-declaration of compliance has been provided (Annex C).

Wearing protective headwear that meets the requirements of this Standard will reduce the likelihood of injuries to the head. It should be noted, however, that there is a limit to the amount of protection provided by such headwear. It remains the responsibility of the users of this Standard to judge a headwear product's suitability for their particular purpose and to ensure the compatibility of their headwear with associated equipment, e.g., hearing protection devices. Users should consult applicable occupational safety regulations to determine whether they impose safety requirements in addition to or more stringent than those in this Standard.

This Standard was prepared by the Technical Committee on Industrial Protective Headwear, under the jurisdiction of the Strategic Steering Committee on Occupational Health and Safety, and has been formally approved by the Technical Committee.

Notes:

1) Use of the singular does not exclude the plural (and vice versa) when the sense allows.

2) Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

3) This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.

4) To submit a request for interpretation of this Standard, please send the following information to inquiries@csagroup.org and include “Request for interpretation” in the subject line:

a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;

b) provide an explanation of circumstances surrounding the actual field condition; and

c) where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue.

Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are available on the Current Standards Activities page at standardsactivities.csa.ca.

5) This Standard is subject to review five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include “Proposal for change” in the subject line:

a) Standard designation (number);
b) relevant clause, table, and/or figure number;
c) wording of the proposed change; and
d) rationale for the change.
1 Scope

1.1 This Standard applies to protective headwear for industrial, construction, mining, utility, and forestry workers. It defines the areas of the head that are to be protected and includes basic performance requirements for dielectric strength, impact attenuation, penetration resistance, passive retention (stability), and shell flammability and liner ignition resistance.

1.2 This Standard includes requirements for and provides guidance on the selection, care, and use of protective headwear.

1.3 The tests specified in this Standard set minimum performance requirements for protective headwear but do not cover other design factors such as comfort, service life, or appearance. 

Note: Compliance with the requirements of this Standard does not imply equality of performance among different types of protective headwear, nor should it be interpreted to mean that a headwear product is capable of affording greater protection than is specified in this Standard.

1.4 This Standard does not apply to “bump caps”, firefighting helmets, rescue helmets, crash helmets, sports and recreation helmets, or riot control helmets.

1.5 In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

2 Reference publications
This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.